Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original): An o-ring monitoring device for a vacuum system comprising:

a piezoelectric element with a pair of ends for externally connecting to a signal processor;

said piezoelectric element disposed and placed to be fully insulated within a mold cavity, said mold cavity having a predetermined diameter and cross-section shape;

said mold cavity filled with an elastic material encapsulating said piezoelectric element therein.

2. (Currently Amended): The monitoring device of claim 1, wherein a voltage "q" is generated as feedback to said signal processor, said voltage "q" is proportional to the amount of applied force "F_q", and is given as:

$$q = [I]X_i F_q$$

where $[I]X_i$ is the piezoelectric constant.

3. (Original): The monitoring device of claim 1 wherein said piezoelectric element is selected from the group consisting of quartz, rochelle salt, barium titanate, lead zirconate, and lead titanate.

4. (Original): The monitoring device of claim 1 wherein said elastic material is selected from the group consisting of all rubber compounds used for sealing applications.

5. (Currently Amended): The sealing device of claim 1 wherein said piezoelectric element has an oblong cross section and a plurality of conducting charge collectors attached on opposite sides of said oblong cross-section ~~are used~~ to provide a reading of seal compression.

6. (Original): The sealing device of claim 1 wherein circumferentially encapsulating said piezoelectric element within an o-ring provides real-time monitoring of o-ring performance during ultra-high vacuum operations.

7. (Original): The sealing device of claim 6 wherein said real-time monitoring of o-ring performance eliminates lengthy maintenance problem-solving studies, most importantly, early detection precludes product waste, shortens debug time, and increases machine utilization.

8. (Original): The sealing device of claim 6 wherein said real-time monitoring of an o-ring performance eliminates back-tracking to find product defects caused by undetected o-ring failure.

9. (Currently Amended): A vacuum system comprising an o-ring sealing device[[.]],

said o-ring sealing device having a piezoelectric element molded therein;

said piezoelectric element having a pair of lead wires that egress from an outer and side periphery of said o-ring;

said o-ring sealing device placed in an o-ring groove and compressed between two surfaces;

said pair of lead wires connected to a signal processor.

10. (Currently Amended): The ~~o-ring sealing device~~ vacuum system according to claim 9 wherein said compression is between two flanged surfaces and generates and provides a feedback voltage value "q" to said signal processor, said feedback voltage is proportional to the amount of compressive force "F_q", and is given as;

$$q = [I]X_i F_q$$

where $[I]X_i$ is the piezoelectric constant.

11. (Currently Amended): The ~~o-ring sealing device~~ vacuum system according to claim 10, wherein "*q*" stabilizes after a desired vacuum level is reached, and any variance thereafter signifies a change in compressive force "*Fq*", indicating a warning of a potential leak or of a defective o-ring.

12. (Currently Amended): The ~~o-ring sealing device~~ vacuum system according to claim 9, wherein a plurality of o-ring sealing devices used in a vacuum system simplifies maintenance debug by immediately indicating the position of a defective o-ring by providing a feedback signal indicating a specific o-ring failure during the vacuum process.

13. (Currently Amended): The ~~o-ring sealing device~~ vacuum system according to claim 12, wherein said plurality of o-ring sealing devices used in a vacuum system eliminates the otherwise time consuming search for a defective seal which causes a high number of defects before it is identified as being defective.

14. (Currently Amended): A method for monitoring compression stability of an o-ring seal during vacuum operations, comprising the steps of:

providing an o-ring seal with a piezoelectric element encapsulated therein~~;~~, said piezoelectric element with a pair of ends for externally connecting to a signal processor~~;~~, the providing step including:

placing said piezoelectric element ~~placed~~ within a mold cavity of a predetermined diameter and cross-section shape;

filling said mold cavity ~~filled~~ with an elastic material for molding ~~an~~ said o-ring having a fully encapsulated and insulated piezoelectric element; and

curing said molded o-ring, and

placing said molded o-ring with an encapsulated piezoelectric element in an o-ring groove for sealing a vacuum chamber;

connecting said pair of ends ~~of said conducting charge collectors~~ to a signal processor for monitoring compression stability of said o-ring.

15. (Currently Amended): The method of claim 14 wherein a voltage "q" is generated as feedback to said signal processor, said voltage "q" is proportional to the amount of applied force "F_q", and said voltage "q" is given as;

$$q = [I]X_i F_q$$

where $[I]X_i$ is the piezoelectric constant.

16. (Original): The method of claim 14 wherein said piezoelectric element is selected from the group consisting of quartz, rochelle salt, barium titanate, lead zirconate, and lead titanate.

17. (Original): The method of claim 14 wherein said elastic material is selected from the group consisting of all rubber compounds used for sealing applications.

18. (Currently Amended): The method of claim 14 wherein said piezoelectric element comprises a pair of conducting charge collectors attached on opposite sides of ~~said~~ an oblong cross-sectional shape, and said conducting charge collectors are used to provide an output value of seal compression.

19. (Original): The method of claim 14 wherein said piezoelectric element that is encapsulated within an o-ring provides real-time monitoring of an o-ring's performance during vacuum operations.

20. (Original): The method of claim 19 wherein said real-time monitoring to determine o-ring performance eliminates lengthy problem-solving studies while early detection precludes product waste, shortens debug time and increases machine utilization.

21. (Original): The method of claim 19 wherein said real-time monitoring for o-ring performance eliminates back-tracking to find product defects caused by undetected o-ring failure.